

Technical Documentation for the 1998 Reallocation of Allowances

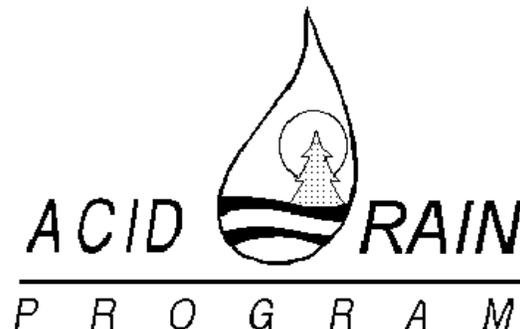
Prepared for:

U.S. Environmental Protection Agency
Acid Rain Division
Office of Atmospheric Programs
Washington, D. C. 20460

Prepared by:

ICF Incorporated
9300 Lee Highway
Fairfax, VA 22031-1207

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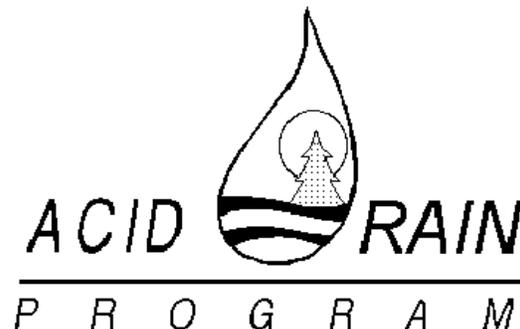


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Introduction

Title IV of the Clean Air Act Amendments of 1990¹ introduces a broad range of measures meant to reduce the adverse effects of acid deposition by reducing emissions of acid rain precursor pollutants, including sulfur dioxide (SO₂) and oxides of nitrogen (NO_x). Overall SO₂ emissions are to be reduced by 10 million tons from 1980 levels in the contiguous United States. SO₂ reductions are accomplished through a set of emissions limitations, which specify an overall level of permissible emissions from electric utility plants. Compliance with the SO₂ limitations is enforced through a system of *allowances*, where one allowance authorizes the emission of one ton of SO₂ in a given year. Through an allowance trading system, affected sources decide the most cost-effective way to comply with the Act. At the end of each year, the allowances a unit holds in its Allowance Tracking System (ATS) account must equal or exceed the unit's annual SO₂ emissions. Any allowances in excess of the emissions may be sold or "banked" for use in future years.

Final Phase II allowances were allocated on March 23, 1993 (40 CFR §73.10). However, Title IV (§403(a)(1)) requires EPA to revise the allowance allocations no later than June 1, 1998 to account for units eligible for allowances under section 405(g)(4) (units commencing operation from 1992 through 1995), units eligible for allowances under section 405(i)(2) (units that reduce their emissions rates), and section 409 (units with approved repowering extensions). The rule establishing the methodology for the 1998 revision of allowance allocations was published on March 23, 1993 and codified at §73.11. This report presents and documents the calculation of the revised allowance allocations. The calculations were developed using the National Allowance Data Base (NADB) version 2.2 and the Supplemental Data File (SDF), version 2.2 and following the methodology from §73.11.

The Phase II allowances which are allocated by EPA for the installation of qualifying clean coal repowering technology, the use of renewable energy, or the implementation of conservation measures under §409, §404(f)(2)(E) or §404(f)(2)(F), respectively, are *not* included herein.² Those allowances will be allocated to specific qualifying utilities and/or units through regulations under 40 CFR Parts 72 and 73. However, this report *does* calculate the effect of set-asides for these reserves on Phase II allowance allocations.

Organization of the Report

This report is divided into three chapters and three appendices. Chapter 1 presents a brief discussion of aggregate allowance allocations by state and category. Chapter 2 reviews, section by section, the portions of Title IV that affect Phase II allowances. For each subsection or paragraph, the selection criteria and allowance calculations for B/Gs (see explanation below) affected by the provision are summarized. Chapter 3 presents an analysis of the estimated amount of qualifying" Phase II clean coal repowering under section 409.

¹ "Title IV–Acid Deposition Control", 42 U.S.C. 7651.

² The report also does not present such other allowance allocations as Phase I allowances, Phase I extension allowances, substitution allowances, allowances from EPA's auctions and sales, or allowances allocated to "opt-in" sources under 40 CFR Part 74.

This report presents *unit level* Phase II allowance allocations, as stipulated in Title IV. The term "unit" is defined in both the statute and the final rule as a "fossil fuel-fired combustion device," or more commonly a "boiler." However, for purposes of describing and calculating the allowance allocations, the term "boiler/generator", or "B/G," is used in this report to refer to the same boiler-generator combinations which identify individual records in the NADB and SDF. In the provision descriptions and equations below, the terms "B/G", "B/G's" and "B/G level" are to be understood as applying to boiler-generator combinations at affected units. Thus, the allowance allocations presented in Tables A.1 and A.2 of Appendix A, "Boiler/Generator Level Phase II Allowance Allocations" for 2000-2009 and for 2010 and thereafter, respectively, are allocations at the same level as individual data records in the NADB and SDF, while Tables A.3 and A.4, "Boiler Level Phase II Allowance Allocations" for 2000-2009 and for 2010 and thereafter, respectively, present boiler level allocations, or allocations at the "unit" level (i.e., the sum of all B/G level allowances for each affected boiler) as specified in Title IV. These unit level allowances are the allocations presented in Table 2 of §73.10 of the final reallocation rule.

There are three appendices to the report. Appendix A contains four tables which present basic and bonus Phase II allowance allocations. Tables A.1 and A.2 present "Boiler/Generator Level" allowance allocations, as described above, along with identification "flags" which identify the provision(s) under which each B/G is allocated allowances. Tables A.3 and A.4 list unit level allowance allocations, which represent the sum of allowances allocated to each boiler-generator combination at a given boiler. Appendix B contains a glossary of key terms and abbreviations. Appendix C lists the actual SAS source code used in the allocation calculations, along with programmer's notes regarding the source code.

Chapter 1 — Summary of Phase II Allowance Allocations

Phase II Allowances — Summary

Under Title IV, two groups of allowances are allocated pursuant to a series of formulas in §403, §404, §405, and §406. "Basic" Phase II allowances, limited to an annual total of 8.9 million tons of SO₂, are allocated to affected units each year beginning in 2000. In addition, up to 530,000 "bonus" Phase II allowances are allocated each year from 2000 through 2009, generally to units with low utilization during the baseline period and units in certain "clean" states, pursuant to §403, subsections (a)(2), (b)(2), (c)(4), (d)(3), and (h)(2) of §405, and §406. The list of annual allowance allocations and set-asides for the period are shown in Figure 1.1 and described below:

Basic Allowances

- ! *Basic allowances* are allocated beginning in 2000 and for each year thereafter, pursuant to section 405. Basic allowances are subject to a limitation of 8.9 million tons. If the basic allowances calculated under §405 exceed 8.9 million tons, they are to be reduced, *pro rata* (or "ratcheted"), to the 8.9 million ton level, as shown in figure 1.1 and discussed below.
- ! A set-aside (from the 8.9 million ton level) from total basic allowances is made to provide for "qualifying" Phase II clean coal technology (CCT) repowering extensions granted under §409. Units that qualify under the provision receive extra non-transferrable allowances for the extension period. Basic allowances for all units are reduced *pro rata* by the number of extension allowances granted during the year 2000 *only*, with 10 percent of the extension allowances deducted per year, for the period 2000-2009. The amount of qualifying CCT repowering has been calculated based on repowering plans activated by December 31, 1997, as required by 40 CFR §72.44(c)(3) (see Chapter 3).
- ! Pursuant to §404(g), a "Conservation and Renewable Energy Reserve" of 300,000 allowances is created by deducting 30,000 allowances from basic allowances, *pro rata*, each year from 2000 through 2009.
- ! Pursuant to §416(b), a "Special Allowance Reserve," containing allowances to be disbursed under the auction and sale provision (under other subsections of §416), is created by withholding 250,000 allowances for each year beginning in 2000.

Bonus Allowances

- ! For the 2000-2009 period, up to 530,000 *bonus allowances* are allocated pursuant to §403; subsections (a)(2), (b)(2), (c)(4), (d)(3), and (h)(2) of §405; and §406. Pursuant to §406, units in certain "clean" states (i.e., states with a 1985 statewide SO₂ emission rate of 0.8 lb/mmBtu or less), upon the election of the Governor(s) thereof, may be allocated bonus allowances calculated differently from, and in lieu of, the "regular" bonus allowance provisions in §405. The total of §406 allowances is limited to 125,000 tons annually.

Other Allowances

- ! Pursuant to §405(a)(3), an additional 50,000 Phase II allowances are allocated to Phase I affected units in Alabama, Georgia, Illinois, Indiana, Kentucky, Missouri, Ohio, Pennsylvania, Tennessee, and West Virginia (excluding units at Kyger Creek, Clifty Creek, and Joppa Steam), allocated *pro rata* based on total basic allowances received by these units. These allowances are *not* subject to the 8.9 million ton limitation.

Figure 1.2 shows annual allowance allocations for years 2010 and thereafter. These allocations are somewhat simpler. Bonus allowance allocations cease, as do the deductions for the CCT Repowering set-aside and the Conservation and Renewable Energy reserve. Basic allowances for the period also change slightly, for units affected under §§405(c)(3), 405(c)(5), and 405(h)(3), as described in detail in Chapter 2. This change causes a minor change in other units' allowances when basic allowances are adjusted to the 8.9 million ton level (i.e., the "ratchet" changes) and alters slightly the distribution of allowances allocated pursuant to §405(a)(3).

Totals for each allowance category are presented in Table 1.1. Allowances in Figures 1.1 and 1.2 and Table 1.1 are rounded to the thousands place while allowances in Table 1.2 are exact.

Table 1.2 presents totals, by state, for final basic allowances (i.e., adjusted basic allowances less the deductions for the various reserves), bonus allowances, and several other categories, as discussed above and presented in Table 1.1. It should be noted that because the State of Idaho contains no units eligible for Phase II allowance allocations, total statewide allowance allocations equal zero for all of Phase II.

Figures 1.1 and 1.2 summarize and depict graphically the allocation of annual Phase II allowances. Total annual Phase II allowances allocated under Sections 405 and 406, as calculated for this report for the years 2000 through 2009, number approximately 9.14 million, of which about 8.6 million are final basic allowances, 50,000 are allowances allocated under §405(a)(3), and 522,000 are bonus allowances allocated under §§405 and 406. For the years following 2009, total annual Phase II allowances number 8.7 million, of which 50,000 are allowances allocated under §405(a)(3), and 8.65 million are final basic allowances.

FIGURE 1.1 ALLOCATION OF ANNUAL PHASE II ALLOWANCES 2000-2009

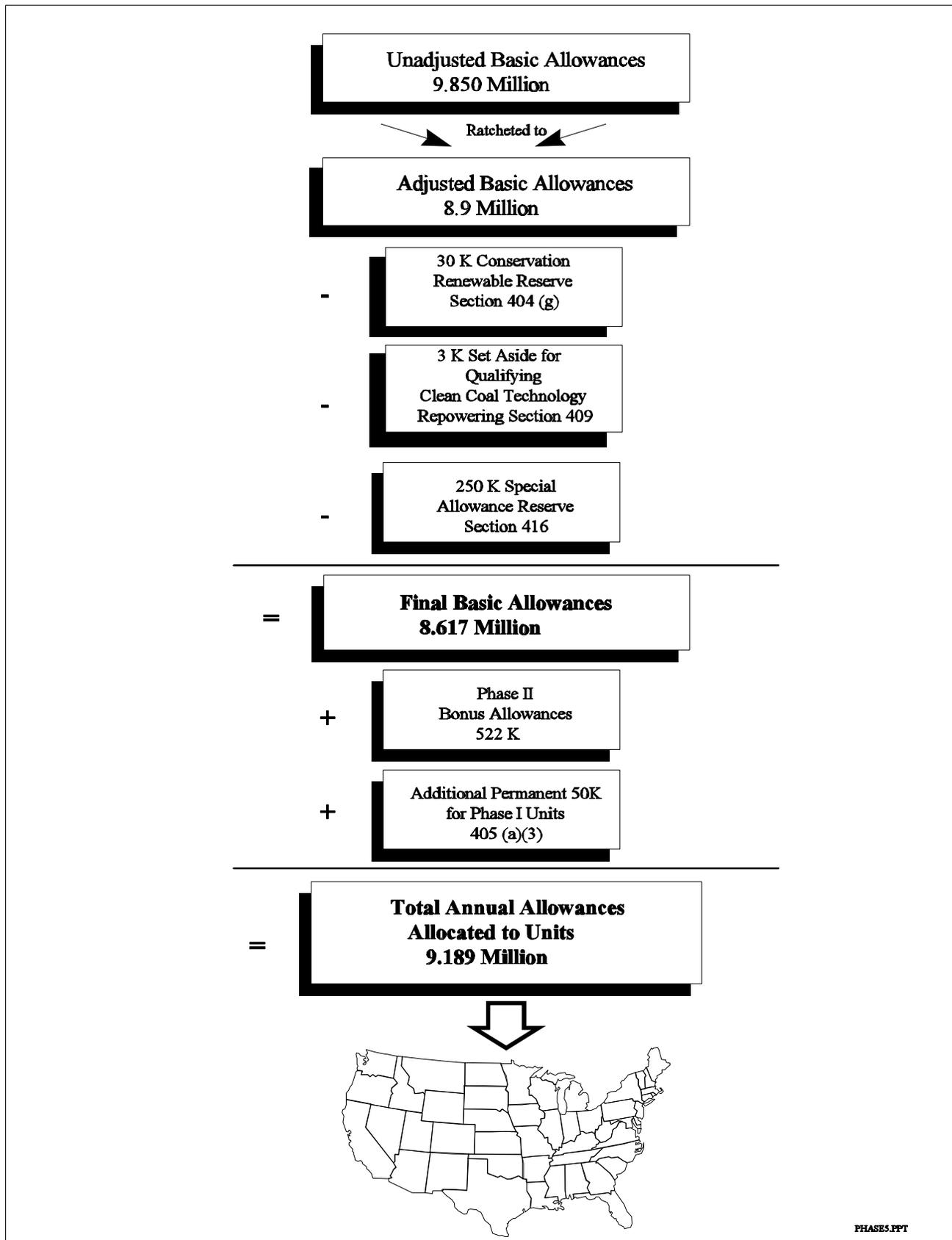


FIGURE 1.2 ALLOCATION OF ANNUAL PHASE II ALLOWANCES 2010 AND LATER

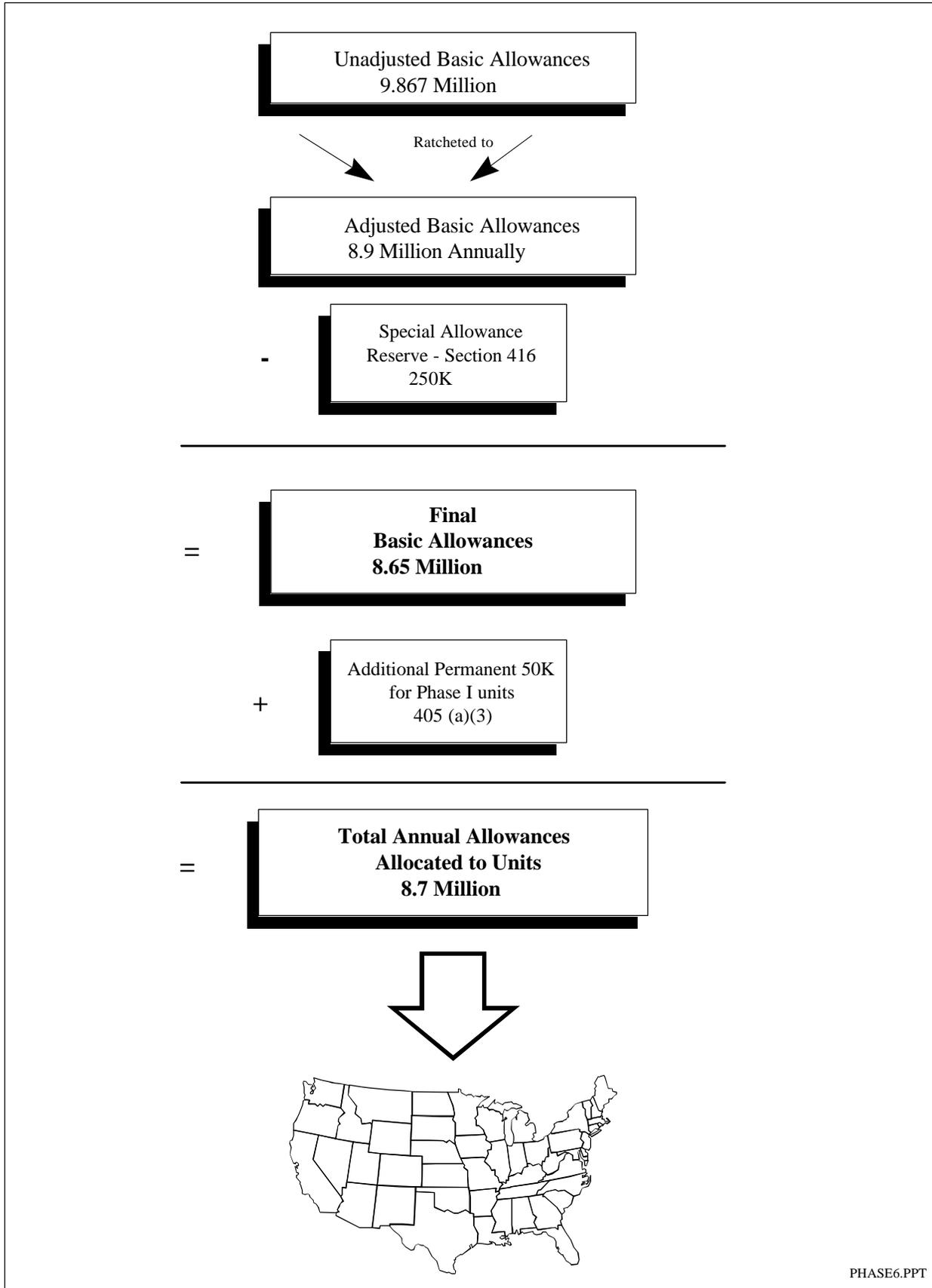


Table 1.1
Source of Phase II Allowances By Provision
(thousands annually)

Provision for Allowance Allocation	2000-2009 Total	2010 + Total
§405 (subsections b,c,d,e,f,g,h,i,j) — Basic Allowances (unadjusted)	9,850	9,867
§403(a)(2) — Basic Allowances Adjusted to 8.9 million (the "ratchet")	8,900	8,900
§404(g) — Set-Aside for Energy Conservation and Renewable Energy Reserve	(30)	--
§409 — Set-Aside for Repowering Projects	(2,713)	--
§416 — Set-Aside for Special Allowance Reserve (250,000)	(250)	(250)
Final Basic Allowances	8,617	8,650
§405 (subsections a(2),b,c,d,h), §406 — Bonus Allowances	522	--
§405(a)(3) — Additional 50k for Phase I Affected Units	50	50
Total Annual Phase II Allowances	9,189	8,700

Chapter 2 - Phase II Allowance Calculations

Introduction

This chapter describes, by provision, the calculations used to allocate Phase II allowances for each relevant section of Title IV. All interpretations of provisions and all definitions of terms were developed by EPA through the regulatory process. The primary data source used in these calculations is the National Allowance Data Base (NADB), version 2.2.³ The other principal data source used for the Phase II calculations was the Supplemental Data File, version 2.2 (SDF). For a detailed technical description of the sources, assumptions, and interpretations used in developing the SDF, see "Appendix G: Technical Documentation for the Supplemental Data File," included in the NADB Technical Support Document. The allowance allocation calculations were performed using the Statistical Analysis System (SAS) software package (See Appendix C).

Several of the provisions listed below allow eligible utilities and/or states to choose, or "elect," the provision(s) under which they will receive allowances. In the absence of a formal election, units were allocated allowances based on the election which maximizes allowances for the unit, utility, or state, as appropriate. However, if explicit elections were made by utilities and/or states, those elections are the basis for the calculation.

The provisions of the Act which affect unit level Phase II allowance calculations are listed below, in order, along with a brief description of applicability and the calculations required. The first two sections of this chapter describe the provisions listed in sections 403 and 404. The third section of this chapter describes section 405. Finally, sections 406, 409, and 416, which also affect Phase II allowance allocations, are described. A glossary of key terms and abbreviations is provided as Appendix B.

The Act requires the Agency to allocate allowances to units (boilers). However, many of the provisions in the statute for allocating allowances require that the boilers' tie to specific generators be made in order to perform the calculations (e.g., §405(c)(3) describes units serving generators smaller than 75 MW). In many cases, boilers serving more than one generator may qualify for a specific provision on the basis of one pairing but not another (e.g., in cases where the generators attached to a given boiler are of different sizes). Therefore, the NADB and SDF contain separate data records for each boiler/generator pairing to distinguish between these pairings. The boiler/generator pair is the basis, then, for all the allowance calculations contained within this report and in the final rule. Once all the individual calculations have been made at the B/G level (as shown in Tables A.1 and A.2 of Appendix A), the values for the allocations are summed for each boiler, resulting in allocations at the boiler level (as shown in Tables A.3 and A.4 of Appendix A).

Many allowance provisions are limited to "existing" units. Under Title IV, an existing unit is one that commenced commercial operation before enactment, November 15, 1990. If the boiler has an on-line date of November 1990 or earlier in the NADB, EPA considers it to have commenced commercial operation prior to enactment.

In a number of provisions, eligibility requirements and/or allowance calculations are based on a unit's (or a B/G's) annual operating factor on a percentage basis (usually either at

³ See *National Allowance Data Base Version 2.2 Technical Support Document, 1998 Revision* (NADB TSD), prepared for EPA by EH Pechan and Associates.

60 or 65 percent). In the provision descriptions and equations below, the NADB data field name for B/G annual fuel consumption at a 60 percent capacity factor, "HT60SHR", will be used for cases involving a 60 percent capacity factor at the B/G level. Furthermore, the formula:

$$HT60SHR \times \frac{65}{60}$$

will be used for cases involving a 65 percent capacity factor at the B/G level.

Section 403 — Basic Allowance "Ratchet"

Introduction

Section 403 limits for the overall annual total of basic allowances and sets a timetable for the calculation of all Phase II allowance allocations (subsection (a)). Subsections (b) and (d) specify the requirements for allowance transfer and tracking systems, while subsection (c) specifies a timetable for EPA to furnish Congress with a study on the effects of interpollutant trading. Subsection (e) provides for SO₂ emissions limitations for new utility units. Finally, subsections (f), (g), (i), and (j), specify a number of definitions, statutory requirements, prohibitions, and exemptions from existing laws and regulations. The only subsection relevant to the calculation of Phase II allowance allocations is subsection (a), which is discussed in more detail below.

Section 403 — Basic Allowance "Ratchet"

Eligibility:

All affected B/Gs at affected sources.

Allocation Formula:

All affected B/Gs are to receive annual allowance allocations in an amount equal to "the annual tonnage limitation calculated under § 404, 405, 406, 409, or 410, except as otherwise specifically provided" elsewhere in the Act. Apart from allowances allocated pursuant to §405(a)(2) (bonus allowances), §405(a)(3) (additional 50K for Phase I units), §409 (repowering extensions), and §410 ("opt-in" sources), the total of such annual allocations (i.e., of "basic Phase II allowances") is limited to 8.9 million tons, beginning January 1, 2000. If total unadjusted annual basic Phase II allowances exceed this level, they are to be reduced, *pro rata*:

$$\frac{B/G's \text{ Adjusted}}{\text{Basic Allowances}} = \frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} \times \frac{8.9 \text{ Million}}{\left[\sum_{i=1}^{\text{All B/Gs}} \left(\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} \right)_i \right]}$$

Section 404 — Reserve Adjustments, Special Allowance Provisions

Introduction

Section 404 is primarily concerned with Phase I allowance allocations (i.e., allocations for 1995 through 1999). However, subsections (g) and (h) affect the calculation of Phase II allowance allocations. Subsection (g) provides for the establishment of an "Energy Conservation and Renewable Energy" Reserve and for set-asides from basic Phase II allowance allocations to "stock" the reserve. Subsection (h) provides for the use of an alternative baseline for eligible units in certain utility systems.

Section 404(g) — Energy Conservation and Renewable Energy Reserve

Introduction

Section 404(f) establishes the definitions and eligibility requirements for the allocation of allowances from an "Energy Conservation and Renewable Energy" reserve. Pursuant to §404(g), this reserve, totaling 300,000 allowances, is created by setting aside 30,000 basic Phase II allowances, *pro rata*, for each year from 2000 through 2009.

Eligibility:

All B/Gs allocated basic Phase II allowances.

Allocation Formula:

The deduction for the Energy Conservation and Renewable Energy Reserve is calculated by reducing adjusted basic allowance allocations according to the formula:

$$\frac{\text{B/G Deduction for Energy Conservation and Renewable Energy Reserve}}{\text{B/G's Adjusted Basic Allowances}} = \frac{\text{B/G's Adjusted Basic Allowances}}{8.9 \text{ Million}} \times 30,000$$

Section 404(h) — Special Allowances for Low Emission Rate Units in Low Emission Rate Systems

Eligibility:

B/Gs with an emission rate below 1.0 lbs/mmBtu (as of enactment), that decreased their SO₂ rate by 60 percent or more from 1980 to 1990, and are part of a utility system whose weighted average SO₂ emissions rate for all fossil fuel-fired B/Gs was lower than

1.0 lbs/mmBtu as of 1990. (Limited to units listed in Table A of the Act [Table 1 of 40 CFR §73.10]).

Allocation Formula:

B/Gs eligible for this provision may use either their regular baseline as defined in §402, or the value from the NADB data field HT60SHR, with the appropriate SO₂ emission rate as specified pursuant to §404(h)(2). Pursuant to paragraph (2), if B/Gs eligible for paragraph (1) choose HT60SHR, they must use the lesser of a 1.0 lb. rate or their actual 1989 rate for §405 allowances:

$$B/G's \text{ Unadjusted Basic Allowances} = HT60SHR \times \left[\text{The Lesser of} \left(\begin{array}{c} 1.0 \text{ or} \\ \text{The B/G's} \\ 1989 \text{ SO}_2 \\ \text{Emission Rate} \end{array} \right) \right] \div 2,000$$

Allowances calculated by this equation will be allocated in lieu of allowances calculated under §405. If the baseline under §402(4) is elected, allowances will be allocated under §405, as appropriate. Information on 1980 and 1989 SO₂ emission rates and B/G and utility system weighted average SO₂ emission rates as of enactment (1990) was obtained from the Supplemental Data File.

Section 405(a) — General Conditions for Phase II Allowance Allocations

Introduction

Section 405(a) specifies general conditions for the allocation of basic Phase II allowances, and stipulates that bonus allowances (not to exceed 530,000 annually) are to be allocated pursuant to the relevant provisions of §405 and §406 during the period from 2000-2009. §405(a) also provides for a set-aside from basic Phase II allowance allocations to provide for additional allowances to be granted to units qualifying as Clean Coal Repowering projects pursuant to §409. Finally, §405(a) provides for an additional 50,000 allowances to be allocated to Phase I affected units in certain states.

Section 405(a)(1) — Allowances for Units Not Operating in 1985

Eligibility:

B/Gs that are part of existing utility units subject to emissions limitations under §405 are "affected" units. (See Appendix B for a description of the different types of affected units, including both "existing" and "new" units, among other classifications.) In addition, this provision outlines how allowances are to be allocated, and explains that B/Gs not operating in 1985 shall use a subsequent year's emission rate (the

representative year emission rate or the NADB data field "RY_ER", if applicable) for purposes of this section.

Allocation Formula:

EPA calculated all allowances for B/Gs with no 1985 SO₂ rate by first substituting the representative year's rate for such B/Gs.⁴ For those B/Gs with a zero 1985 SO₂ rate and a zero representative year's rate, EPA substituted the 1985 SO₂ limit, if available, for coal B/Gs with a nonzero baseline. If the 1985 SO₂ limit was unavailable (i.e., specified as the value 99.9 in the NADB), coal B/G's were assigned a 1985 SO₂ rate of zero. Oil and gas B/Gs with a zero SO₂ rate and a zero representative year's SO₂ rate had their emissions rate set to zero for purposes of calculating allowances.

Section 405(a)(2) — Bonus Allowances

Eligibility:

All B/Gs receiving bonus allowance allocations pursuant to subsections (b)(2), (c)(4), (d)(3)(A), (d)(3)(B), and (h)(2) of §405, and §406.

Allocation Formula:

Bonus allowances, not to exceed 530,000 annually, are allocated for the years 2000-2009, under the provisions listed under "Eligibility," above.

Section 405(a)(2) — Set-Aside for Clean Coal Repowering

Further, pursuant to §409, total adjusted basic allowances are to be reduced for the period 2000-2009, to provide a set-aside for repowering extension allowances. The total set-aside is equal to the sum of the differences, for each qualifying repowered B/G, between:

- A) Allowances calculated based on the B/G's baseline times the lesser of the B/G's 1995 actual or federally enforceable SIP SO₂ limit, divided by 2,000, and
- B) The B/G's adjusted basic allowances (subject to the 8.9 million limitation).

The total of this set-aside is estimated to equal 27,124 allowances for the 10-year period. As noted in Chapter 1 and discussed in more detail in Chapter 3, an estimate of the amount of qualifying repowering was used because repowering allowances have not been allocated. (See Chapter 3). One-tenth of the set-aside is deducted each year. Because 27,124 is not divisible

⁴ According to the *National Allowance Data Base Version 2.2 Technical Support Document*, "[t]he representative year SO₂ emission rate...is included for those cases in which there is a positive baseline value but no 1985 emission rate. This field equals the 1985 (or 1986 or 1987) SO₂ emission rate calculated from DOE data."

by ten, EPA rounded the annual deduction up to 27,130 in order to provide sufficient allowances for repowering.

Eligibility:

All B/Gs allocated basic allowances under §405.

Allocation Formula:

The deduction for the CCT Repowering set-aside is determined by reducing adjusted basic allowances according to the formula:

$$\frac{\text{B/G Deduction for CCT Repowering Set-Aside}}{\text{B/G's Adjusted Basic Allowances}} = \frac{27130}{8.9 \text{ Million}} \times \text{B/G's Adjusted Basic Allowances}$$

Section 405(a)(3) — Additional Phase II Permanent Allowances for Phase I Affected Units

Eligibility:

Phase I affected B/Gs (limited to units listed in Table A of the Act or Table 1 of 40 CFR §73.10) in the states of Illinois, Indiana, Ohio, Georgia, Alabama, Missouri, Pennsylvania, West Virginia, Kentucky, or Tennessee (not including B/Gs at Kyger Creek, Clifty Creek, and Joppa Steam).

Allocation Formula:

B/Gs eligible for §405(a)(3) receive a *pro rata* share of an additional 50,000 allowances, based on their unadjusted basic phase II allowances:

$$\text{B/G's Additional Allowances} = 50,000 \times \frac{\text{B/G's Unadjusted Basic Phase II Allowances}}{\text{Total Unadjusted Basic Phase II Allowances for Eligible B/Gs}}$$

Where

$$\text{Total Unadjusted Basic Phase II Allowances for Eligible B/Gs} = \sum_{i=1}^{\text{Eligible B/Gs}} \left[\text{B/G's Unadjusted Basic Phase II Allowances} \right]_i$$

Section 405(b) — Coal or Oil Fired Units \geq 75 MW and \geq 1.2 lb.

Introduction

Section 405(b) allocates basic and bonus allowances to large existing units (i.e., serving generators with a nameplate capacity larger than 75 MW), whose actual 1985 SO₂ emission rate was greater than or equal to 1.2 lbs/mmBtu. Paragraph (b)(1) allocates basic allowances to these units, while paragraph (b)(2) allocates bonus allowances to certain of these units whose actual 1985 SO₂ emission rate was less than 2.5 lb/mmBtu and whose baseline is less than the value of the NADB HT60SHR data field. Paragraphs (b)(3) and (b)(4) allocate allowances to units which meet certain eligibility requirements, as described below.

Section 405(b)(1) — Basic Allowance Allocations

Eligibility:

Existing B/Gs serving a generator with a nameplate capacity greater than or equal to 75 MW, with an actual 1985 SO₂ emissions rate greater than or equal to 1.2 lbs/mmBtu.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to baseline times 1.2 lbs/mmBtu, divided by 2,000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \lfloor \text{Baseline} \times 1.2 \rfloor \div 2,000$$

Section 405(b)(2) — Bonus Allowance Allocations

Eligibility:

B/Gs subject to §405(b)(1), with an actual 1985 SO₂ emissions rate greater than 1.2 lbs/mmBtu and less than 2.5 lbs/mmBtu, whose baseline is less than the B/G's HT60SHR value.

Allocation Formula:

B/Gs eligible for this provision receive bonus allowances equal to 1.2 lbs/mmBtu times one-half the difference between baseline and HT60SHR, divided by 2000.⁵

$$\frac{B/G's \text{ Bonus}}{\text{Allowances}} = \left[1.2 \times \frac{HT60SHR - \text{Baseline}}{2} \right] \div 2,000$$

Section 405(b)(3) — Basic Allowances for Certain Lignite Units

Eligibility:

Existing B/Gs with an actual 1985 SO₂ emission rate greater than or equal to 1.2 lbs/mmBtu, with greater than 90% of their 1985-87 fuel consumption (on a Btu basis) in the form of lignite coal, and located in a state with no county or portion of a county designated nonattainment under §107. B/Gs were determined to be eligible for this provision based on information from the Supplemental Data File.

Allocation Formula:

B/Gs eligible for this provision are allocated basic allowances equal to baseline times the lesser of the B/G's 1985 SO₂ rate or SO₂ limit, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \text{Baseline} \times \left[\begin{array}{c} \text{The Lesser of the B/G's} \\ \begin{array}{c} 1985 \text{ SO}_2 \text{ Rate} \\ \text{or} \\ 1985 \text{ SO}_2 \text{ Limit} \end{array} \end{array} \right] \div 2,000$$

Section 405(b)(4) — Additional Basic Allowance For Certain Coal Conversion Units

Eligibility:

B/Gs subject to §405(b)(1), located in a state with an installed electrical generating capacity greater than 30 million KW in 1988, that (1) have been issued a prohibition order from burning oil, and (2) converted to coal between January 1, 1980 and December 31, 1985. B/Gs were determined to be eligible for this provision based on information from the

⁵ For programming purposes, the number of bonus allowances was calculated as the increase in total allowances calculated using the average of the B/G's baseline and its HT60SHR value from the NADB, above unadjusted basic allowances:

$$\frac{B/G's \text{ Bonus}}{\text{Allowances}} = \left[\frac{HT60SHR + \text{Baseline}}{2} \times 1.2 \right] \div 2,000 - \frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}}$$

Supplemental Data File.

Allocation Formula:

B/Gs eligible for this provision receive additional unadjusted basic allowances equal to the difference between:

- A) B/G fuel consumption at a 65 percent capacity factor, multiplied by the lesser of the B/G's SO₂ rate or SO₂ limit during the first year after conversion, divided by 2000, and
- B) basic allowances calculated under §405(b)(1).

The total of such additional basic allowances is limited to 5,000.

$$\text{Total B/G Level Unadjusted Basic Allowances} = \left(\frac{\text{Unadjusted Unit Level §405(b)(4) Allowances}}{\text{The Maximum of } \left(\begin{array}{c} \text{Total §405(b)(4) Allowances} \\ \text{or 5,000} \end{array} \right)} \times 5,000 \right) + \text{B/G's Unadjusted Basic Allowances calculated under §405(b)(1)}$$

where

$$\text{Unadjusted B/G Level §405(b)(4) Allowances} = \left(\text{HT60SHR} \times \frac{65}{60} \times \left[\text{The Lesser of the B/G's } \begin{array}{c} \text{SO}_2 \text{ Rate} \\ \text{or} \\ \text{SO}_2 \text{ Limit} \end{array} \div 2,000 \right] \right) - \text{B/G's Unadjusted Basic Allowances calculated under §405(b)(1)}$$

and

$$\text{Total §405(b)(4) Allowances} = \sum_{i=1}^{\# \text{ of } §405(b)(4) \text{ B/Gs}} \text{B/G Level §405(b)(4) Allowances}$$

Note: If the above calculation yields negative additional allowances, then unadjusted B/G level §405(b)(4) allowances are set equal to zero.

Section 405(c) — Coal or Oil-Fired Units < 75 MW, ≥ 1.2 lb.

Introduction

Section 405(c) allocates basic and bonus allowances to small existing units (i.e., serving generators smaller than 75 MW nameplate capacity), whose actual 1985 SO₂ emission rate was greater than or equal to 1.2 lbs/mmBtu. Paragraph (c)(1) allocates basic allowances to units owned by utilities with a total fossil steam capacity greater than or equal to 250 MW (based on the NADB data field "UCAPFSST"), while paragraph (c)(2) allocates basic allowances to units owned by utilities with a total fossil steam capacity less than 250 MW (based on the NADB data field "UCAPFSST"). Paragraph (c)(4) allocates bonus allowances to units eligible for §405(c)(1) whose baseline is less than the unit's HT60SHR value percent. Finally, paragraphs (c)(3) and (c)(5) allocate basic allowances to units meeting certain specific eligibility requirements, with allocations under (c)(3) reverting to the formula given in (c)(1) after 2009.

Section 405(c)(1) — Basic Allowances: Utilities ≥ 250 MW Fossil Steam Capacity

Eligibility:

Existing B/Gs smaller than 75 MW, with an actual 1985 SO₂ rate greater than or equal to 1.2 lbs/mmBtu, owned by utilities with total fossil steam capacity greater than or equal to 250 MW.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to the B/G's baseline times 1.2, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \lfloor \text{Baseline} \times 1.2 \rfloor \div 2,000$$

Section 405(c)(2) — Basic Allowances: Utilities < 250 MW Fossil Steam Capacity

Eligibility:

Existing B/Gs smaller than 75 MW, with an actual 1985 SO₂ rate greater than or equal to 1.2 lbs/mmBtu (excluding B/Gs subject to §111 [i.e., B/Gs required to meet the New Source Performance Standards (NSPS)] or with 1985 SO₂ emissions limit less than 1.2 lb/mmBtu), owned by utilities with total fossil steam capacity less than 250 MW.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to the B/G's baseline times the lesser of its 1985 SO₂ rate or SO₂ limit, divided by 2000:

$$\begin{array}{l} B/G's \text{ Unadjusted} \\ \text{Basic Allowances} \end{array} = \text{Baseline} \times \left[\begin{array}{l} \text{The Lesser of the B/G's} \\ \begin{array}{l} 1985 \text{ SO}_2 \text{ Rate} \\ \text{or} \\ 1985 \text{ SO}_2 \text{ Limit} \end{array} \end{array} \right] \div 2,000$$

Section 405(c)(3) — Basic Allowances for Certain Units in Small Systems

Eligibility:

Existing B/Gs smaller than 75 MW, with an actual 1985 SO₂ rate greater than or equal to 1.2 lbs/mmBtu, which also meet the following conditions:

- became operational on or before December 31, 1965
- owned by a utility operating company with total fossil steam capacity greater than 250 MW and less than 450 MW
- owned by a utility operating company which serves fewer than 78,000 customers as of enactment.

B/Gs were determined to be eligible for this provision based on information from the Supplemental Data File.

Allocation Formula:

For 2000-2009

B/Gs eligible for this provision receive allowances equal to each B/G's baseline multiplied by the lesser of its 1985 SO₂ rate or SO₂ limit, divided by 2000:

$$\begin{array}{l} B/G's \text{ Unadjusted} \\ \text{Basic Allowances} \end{array} = \text{Baseline} \times \left[\begin{array}{l} \text{The Lesser of the B/G's} \\ \begin{array}{l} 1985 \text{ SO}_2 \text{ Rate} \\ \text{or} \\ 1985 \text{ SO}_2 \text{ Limit} \end{array} \end{array} \right] \div 2,000$$

For 2010 and Thereafter

B/Gs eligible for this provision receive basic allowances equal to the B/G's baseline multiplied by 1.2 lbs/mmBtu, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \left[\text{Baseline} \times 1.2 \right] \div 2,000$$

Section 405(c)(4) — Bonus Allowance Allocations

Eligibility:

B/Gs subject to §405(c)(1), with an actual 1985 SO₂ rate greater than or equal to 1.2 but less than 2.5 lbs/mmBtu, and a baseline smaller than the B/G's HT60SHR value.

Allocation Formula:

B/Gs eligible for this provision receive bonus allowances equal to one-half the difference between baseline and HT60SHR, multiplied by 1.2 lbs/mmBtu.⁶

$$\frac{B/G's \text{ Bonus}}{\text{Allowances}} = \left[\frac{\text{HT60SHR} - \text{Baseline}}{2} \times 1.2 \right] \div 2,000$$

Section 405(c)(5) — Basic Allowances for Certain Electric Utility Systems

Eligibility:

Existing B/Gs smaller than 75 MW, with a 1985 SO₂ rate greater than or equal to 1.2 lbs/mmBtu, which also meet the following conditions:

- part of an electric utility system which as of enactment was at least 20 percent scrubbed
- part of an electric utility system which has small (i.e., less than 75 MW) coal B/Gs comprising more than 10 percent of its fossil capacity
- part of an electric utility system that owns very large B/Gs (>400 MW) that have difficult or very difficult FGD retrofit cost factors.⁷

⁶ For the ease of programming, the amount of bonus allowances was calculated as the increase in total allowances calculated using the average of the B/G's baseline and its HT60SHR value from the NADB, over unadjusted basic allowances:

$$\frac{B/G's \text{ Bonus}}{\text{Allowances}} = \left[\frac{\text{HT60SHR} + \text{Baseline}}{2} \times 1.2 \right] \div 2,000 - \frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}}$$

⁷ "Emissions and the FGD Retrofit Feasibility at the 200 Top Emitting Generating Stations," prepared for EPA by Energy Ventures Associates on January 10, 1986.

B/Gs were determined to be eligible for this provision based on information from the Supplemental Data File for the criteria listed above.

Allocation Formula:

For 2000-2009

B/Gs eligible for this provision receive basic allowances equal to baseline times 2.5 lbs/mmBtu, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \text{Baseline} \times 2.5 \div 2,000$$

For 2010 and Thereafter

Eligible B/Gs receive allowances equal to baseline times 1.2 lbs/mmBtu, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \text{Baseline} \times 1.2 \div 2,000$$

Section 405(d) — Coal Units < 1.2 lb. and CCT Demonstration Unit

Introduction

Section 405(d) allocates basic and bonus allowances to existing coal units the lesser of whose actual or allowable 1985 SO₂ emission rate was less than 1.2 lbs/mmBtu. Paragraphs (d)(1) and (d)(2) allocate basic allowances to these units, while paragraph (d)(3) allows utilities to elect to receive bonus allowances. Paragraph (d)(4) provides utilities with an additional option for units that commenced commercial operation during the 1981 to 1985 period, and that were subject to, and met, NSPS requirements. Finally, paragraph (d)(5) allocates basic allowances to an oil/gas unit awarded a clean coal technology demonstration grant as of January 1, 1991.

Section 405(d)(1) — Basic Allowances for Units < 0.6 lb.

Eligibility:

Existing coal B/Gs with the lesser of their 1985 actual SO₂ rate or allowable SO₂ limit less than 0.6 lbs/mmBtu.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to baseline times the lesser of 0.6 or the B/G's SO₂ limit, times 120 percent, divided by 2000:

$$\begin{array}{l} B/G's \text{ Unadjusted} \\ \text{Basic Allowances} \end{array} = \text{Baseline} \times \left[\begin{array}{l} 0.6 \text{ or} \\ \text{The Lesser of } \begin{array}{l} \text{The B/G's 1985} \\ \text{SO}_2 \text{ Emission Limit} \end{array} \end{array} \right] \times 1.2 \div 2,000$$

Section 405(d)(2) — Basic Allowances for Units \geq 0.6 lb.

Eligibility:

Existing coal B/Gs with the lesser of their 1985 SO₂ rate or SO₂ limit greater than or equal to 0.6 and less than 1.2 lbs/mmBtu. Because some B/Gs also meet the requirements of either §405(b) or §405(c), in addition to meeting the requirements of this section, (i.e., B/Gs with an actual 1985 SO₂ emission rate higher than 1.2 lbs/mmBtu, but with a limit lower than 1.2), §405(d)(2) was interpreted by EPA such that the B/G will receive allowances under the provision most beneficial to that B/G.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to baseline times the lesser of the B/G's 1985 SO₂ rate or SO₂ limit times 120 percent, divided by 2000:

$$\begin{array}{l} B/G's \text{ Unadjusted} \\ \text{Basic Allowances} \end{array} = \text{Baseline} \times \left[\begin{array}{l} \text{The Lesser of the B/G's} \\ \begin{array}{l} 1985 \text{ SO}_2 \text{ Rate} \\ \text{or} \\ 1985 \text{ SO}_2 \text{ Limit} \end{array} \end{array} \right] \times 1.2 \div 2,000$$

Section 405(d)(3)(A) — Bonus Allowances for Units < 0.6 lb.

Eligibility:

At the election of the B/G's operating company (see §405(d)(3)(C), below), each B/G subject to §405(d)(1) may receive bonus allowances under this provision.

Allocation Formula:

B/Gs whose utility elects to receive allowances under this provision receive bonus allowances equal to the amount by which the product of the B/G's HT60SHR value, times the lesser of 0.6 or the B/G's 1985 SO₂ limit, divided by 2000, exceeds basic allowances granted pursuant to §405(d)(1):

$$B/G's \text{ Bonus Allowances} = \left(HT60SHR \times \left[\begin{array}{c} 0.6 \text{ or} \\ \text{The Lesser of} \\ \text{The B/G's} \\ 1985 \text{ SO}_2 \text{ Limit} \end{array} \right] \div 2,000 \right) - B/G's \text{ Unadjusted Basic Allowances}$$

Note: If the above calculation yields negative bonus allowances, then bonus allowances will be set equal to zero.

Section 405(d)(3)(B) — Bonus Allowances for Units \geq 0.6 lb.

Eligibility:

At the election of its operating company (see §405(d)(3)(C), below), each B/G subject to §405(d)(2) may receive bonus allowances under this provision.

Allocation Formula:

B/Gs whose utility elects to receive allowances under this provision receive bonus allowances equal to the amount by which the product of the B/G's HT60SHR value, multiplied by the lesser of the B/G's 1985 SO₂ rate or SO₂ limit, divided by 2000, exceeds basic allowances granted pursuant to §405(d)(2):

$$B/G's \text{ Bonus Allowances} = \left(HT60SHR \times \left[\begin{array}{c} 1985 \text{ SO}_2 \text{ Rate} \\ \text{or} \\ 1985 \text{ SO}_2 \text{ Limit} \end{array} \right] \div 2,000 \right) - B/G's \text{ Unadjusted Basic Allowances}$$

Note: If the above calculation yields negative bonus allowances, then bonus allowances will be set equal to zero.

Section 405(d)(3)(C) — Choice of Bonus Must Be Utility-Wide

Eligibility:

Operating companies with B/Gs subject to §405(d), who elect to receive bonus allowances as provided under §405(d)(3)(A) or §405(d)(3)(B).

Allocation Formula:

Utilities making an election under §405(d)(3)(A) or (B) must make such an election for "each and every B/G in the operating company subject to" §405(d). To make this choice, allowances for each utility were summed across all B/Gs for each option. The option which gave the utility the most allowances was used in the calculations, unless the utility had submitted an election which superseded that option.

Section 405(d)(4) — NSPS Units Commencing Commercial Operation 1981 - 1985

Eligibility:

Notwithstanding other parts of §405(d), B/Gs subject to §405(d) which commenced commercial operation on or after January 1, 1981 and before December 31, 1985, subject to and in compliance with §111 (i.e., NSPS B/Gs).⁸

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to fuel consumption at a 65 percent annual operating factor times their 1985 SO₂ limit, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = HT60SHR \times \frac{65}{60} \times \left[\frac{B/G's \text{ 1985}}{SO_2 \text{ Limit}} \right] \div 2,000$$

B/Gs eligible for this provision will receive the maximum of allowances calculated according to this formula or under other applicable provision(s) of §405, unless the

⁸ Note that eligibility for this section includes units meeting all other requirements and which had an "annualized" SO₂ limit in the NADB of 1.2 lbs/mmBtu, since these units' *actual* annualized limit would be *less* than 1.2 lbs/mmBtu. For NSPS units with an emission limit averaging period of 30 days (NADB data field "AVGPD" value of 9), the actual annualization factor is slightly less than one (but when rounded appears as 1.00). Thus, the actual annualized 1985 SO₂ limit for these units is *less* than 1.20, making these units eligible for §405(d)(4).

utility submitted an election to the contrary.

Section 405(d)(5) — Basic Allowances for Clean Coal Technology Demonstration Unit

Eligibility:

An oil and gas B/G, awarded a clean coal technology grant as of January 1, 1991. B/Gs were determined to be eligible for this paragraph based on information from the Supplemental Data File.⁹

Allocation Formula:

The B/G(s) eligible for this provision receives basic allowances equal to baseline times 1.2 divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \text{Baseline} \times 1.2 \div 2,000$$

Section 405(e) — Oil/Gas Units \geq 0.6 lb. but $<$ 1.2 lb.

Introduction

Section 405(e) allocates basic allowances to existing oil and gas units, the lesser of whose 1985 SO₂ rate or SO₂ limit was greater than or equal to 0.6 lbs/mmBtu but less than 1.2 lb/mmBtu.

Eligibility:

Existing oil and gas B/Gs with the lesser of their 1985 SO₂ rate or SO₂ limit less than 1.2 lbs/mmBtu and greater than or equal to 0.6 lbs/mmBtu.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to baseline times the lesser of the B/G's 1985 SO₂ rate or SO₂ limit, times 120 percent, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \text{Baseline} \times \left[\begin{array}{c} 1985 \text{ SO}_2 \text{ Rate} \\ \text{The Lesser of the B/G's} \\ \text{or} \\ 1985 \text{ SO}_2 \text{ Limit} \end{array} \right] \times 1.2 \div 2,000$$

⁹ Note that these units need not be coal-fired, nor have an actual 1985 SO₂ emissions rate less than 1.2 lbs/mmBtu.

Section 405(f) — Oil/Gas Units < 0.6 lb.

Introduction

Section 405(f) allocates basic allowances to existing oil and gas units which burned gas for less than 90 percent of total fuel consumption during the period 1980 through 1989, with the lesser of the unit's 1985 SO₂ rate or limit lower than 0.6 lbs/mmBtu. Paragraph (2) provides up to a total of 7,000 and 2,000 additional basic allowances to units owned by a utility and state authority, respectively, each of which meets certain eligibility requirements.

Section 405(f)(1) — Basic Allowance Allocations

Eligibility:

Existing oil and gas B/Gs with the lesser of their 1985 SO₂ rate or SO₂ limit less than 0.6 lbs/mmBtu, for whom 90 percent or less of total fuel (on a Btu basis) was gas during the period from 1980 to 1989.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to baseline times the lesser of 0.6 or the B/G's 1985 SO₂ limit, times 120 percent, divided by 2000

$$B/G's \text{ Unadjusted Basic Allowances} = \left[\begin{array}{c} 0.6 \text{ or} \\ \text{The Lesser of } B/G's \text{ 1985} \\ \text{SO}_2 \text{ Limit} \end{array} \right] \times \text{Baseline} \times 1.2 \div 2,000$$

Section 405(f)(2) — Additional Basic Allowances for Units Owned by a Certain Utility and a State Authority

Eligibility:

B/Gs operated by a utility which furnishes "electricity, electric energy, steam, and natural gas within an area consisting of a city and one contiguous county," and B/Gs owned by a "State authority," which serves the same city and county. B/Gs were determined to be eligible for this provision based on information in the Supplemental Data File.

Allocation Formula:

B/Gs eligible for this provision receive 7,000 and 2,000 additional basic allowances, respectively, allocated *pro rata* based on the unadjusted basic allowances otherwise received by such B/Gs:

$$\text{Additional Basic Allowances For B/G Operated by §405(f)(2) Utility} = 7,000 \times \frac{\left[\begin{array}{l} \text{B/G's Unadjusted} \\ \text{Basic Allowances} \end{array} \right]}{\sum_{i=1}^{\text{B/Gs in Eligible Utility}} \left[\begin{array}{l} \text{B/G's Unadjusted} \\ \text{Basic Allowances} \end{array} \right]_i}$$

$$\text{Additional Basic Allowances For B/G Owned by §405(f)(2) State Authority} = 2,000 \times \frac{\left[\begin{array}{l} \text{B/G's Unadjusted} \\ \text{Basic Allowances} \end{array} \right]}{\sum_{i=1}^{\text{B/Gs in Eligible State Authority}} \left[\begin{array}{l} \text{B/G's Unadjusted} \\ \text{Basic Allowances} \end{array} \right]_i}$$

Section 405(g) — Units Commencing Commercial Operation During 1986-1995

Introduction

Section 405(g) allocates basic allowances to units commencing commercial operation after 1985. Paragraph (g)(1) allocates allowances for units commencing commercial operation prior to October 1990. Paragraph (g)(2) allocates allowances to units appearing in Table B of §405 of the Act. Paragraphs (g)(3) and (g)(4) allocate allowances to units commencing commercial operation on or after the date of Enactment. Paragraph (g)(5) allocates allowances to units meeting certain eligibility requirements. Finally, §405(g)(6) provides an exemption for qualifying facilities and independent power production facilities, which is not dependent upon these facilities' commencing commercial operation during the 1986-1995 period.

Section 405(g)(1) — Units Commencing Commercial Operation between January 1, 1986 and September 30, 1990

Eligibility:

B/Gs which commenced commercial operation on or after January 1, 1986, but not later than September 30, 1990.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to fuel consumption at a 65 percent annual operating factor times the B/G's 1985 SO₂ limit, divided by 2000.

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = HT60SHR \times \frac{65}{60} \times \left[\frac{B/G's \text{ 1985}}{SO_2 \text{ Limit}} \right] \div 2,000$$

Section 405(g)(2) — Table B Units

Eligibility:

B/Gs appearing in Table B of the Act.

Allocation Formula:

B/Gs appearing in Table B receive the unadjusted basic allowances therein, unless they elect to receive allowances under another subsection for which they are eligible. For purposes of calculating allowance allocations, these B/Gs were allocated the *maximum* of either Table B allowances or allowances calculated under another, relevant subsection of §405(g), unless the relevant utility has made an election which overrides this choice.

Section 405(g)(3) — Units Commencing Commercial Operation between September 30, 1990 and December 31, 1992

Eligibility:

B/Gs which commence commercial operation on or after October 1, 1990, but not later than December 31, 1992.

Allocation Formula:

B/Gs eligible for this provision receive allowances equal to fuel consumption at a 65 percent annual operating factor, times the lesser of 0.3 lbs/mmBtu or the B/G's allowable SO₂ limit, divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = HT60SHR \times \frac{65}{60} \times \left[\text{The Lesser of } \begin{array}{l} 0.3 \text{ or} \\ \text{The B/G's} \\ \text{Allowable} \\ \text{SO}_2 \text{ Limit} \end{array} \right] \div 2,000$$

Section 405(g)(4) — Units Commencing Commercial Operation From 1993 Through 1995

Eligibility:

B/Gs that commenced construction before December 31, 1990, which commence commercial operation on or after January 1, 1993 and before December 31, 1995. B/Gs were determined to be eligible for this provision based on information in the Supplemental Data File. Additional information required to confirm eligibility (i.e., documentation of commencement of construction) was required to be submitted to EPA by December 31, 1995, under 40 CFR §73.18.

Allocation Formula:

B/Gs eligible for this provision will, upon meeting the criteria described above, receive allowances equal to fuel consumption at a 65 percent annual operating factor, times the lesser of 0.3 lbs/mmBtu or the B/G's allowable SO₂ limit, divided by 2000:

$$\text{B/G's Unadjusted Basic Allowances} = \text{HT60SHR} \times \frac{65}{60} \times \left[\begin{array}{l} 0.3 \text{ or} \\ \text{The B/G's} \\ \text{Allowable} \\ \text{SO}_2 \text{ Limit} \end{array} \right] \div 2,000$$

Section 405(g)(5) — Basic Allowances for Certain Units Converting from Gas to Coal

Eligibility:

B/Gs which converted from gas to coal use between January 1, 1985 and December 31, 1987, and which have been issued a proposed or final prohibition order. B/Gs were determined to be eligible for this provision based on information in the Supplemental Data File.¹⁰

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to fuel consumption at a 65 percent annual operating factor times the lesser of the B/G's 1987 allowable SO₂ limit and a 1.2 lb. rate, divided by 2000.

¹⁰ Note: These units are not required to have commenced commercial operation during the 1986-1995 period.

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = HT60SHR \times \frac{65}{60} \times \left[\text{The Lesser of } \begin{array}{l} 1.2 \text{ or} \\ \text{The B/G's} \\ \text{1987 Allowable} \\ \text{SO}_2 \text{ Limit} \end{array} \right] \div 2,000$$

Section 405(h) — >90% Gas Units

Introduction

Section 405(h) allocates basic and bonus allowances to units which burned more than 90 percent of their total fuel consumption (on a Btu basis) during the period from 1980 through 1989 in the form of natural gas. Paragraph (h)(3) provides additional basic allowance allocations for these units, once the bonus allowances allocated pursuant to paragraph (h)(2) cease.

Section 405(h)(1) — Basic Allowance Allocations

Eligibility:

Existing oil and gas B/Gs which burned more than 90 percent (on a Btu basis) of their total 1980-89 fuel consumption in the form of gas.

Allocation Formula:

B/Gs eligible for this provision receive basic allowances equal to baseline times the B/G's 1985 SO₂ rate divided by 2000:

$$\frac{B/G's \text{ Unadjusted}}{\text{Basic Allowances}} = \text{Baseline} \times \left[\frac{B/G's \text{ Actual}}{1985 \text{ SO}_2 \text{ Rate}} \right] \div 2,000$$

Section 405(h)(2) — Bonus Allowance Allocations

Eligibility:

B/Gs subject to §405(h)(1).

Allocation Formula:

B/Gs eligible for this provision receive bonus allowances equal to baseline times 0.05, divided by 2000, for the period 2000-2009:

$$\frac{B/G's \text{ Bonus}}{\text{Allowances}} = \lfloor \text{Baseline} \times 0.05 \rfloor \div 2,000$$

Section 405(h)(3) — Additional Basic Allowances (after 2009)

Eligibility:

B/Gs subject to §405(h)(1).

Allocation Formula:

B/Gs eligible for this provision receive additional basic allowances equal to baseline times 0.05, divided by 2000, beginning January 1, 2010.

$$\frac{B/G's \text{ Additional Unadjusted}}{\text{Basic Allowances}} = \frac{\text{Baseline} \times 0.05}{2,000}$$

Section 405(i) — Units in High Growth States and Units with Reduced Emissions

Introduction

Section 405(i) allocates two sets of additional Phase II basic allowances. §405(i)(1) allocates an additional 40,000 allowances *pro rata* to units in certain states with high population growth in the 1980s, while §405(i)(2) allocates up to 5,000 additional allowances *pro rata* to certain units with declining actual or allowable SO₂ emissions that also meet other eligibility requirements.

Section 405(i)(1) — Additional Basic Allowances for Units in High Growth States

Eligibility:

Phase II affected B/Gs in states with a population growth greater than 25 percent between 1980 and 1988 and with an installed electrical generating capacity of more than 30 million KW in 1988. B/Gs were determined to be eligible for this provision based on information in the Supplemental Data File.

Allocation Formula:

B/Gs eligible for this provision receive a *pro rata* share of up to 40,000 additional basic allowances, where the additional allowances are equal to the difference between:

- allowances calculated based on the B/G's average annual fuel consumption for any three consecutive calendar years from 1980 to 1989 inclusive, and
- allowances calculated with the standard 1985-87 baseline,

provided that such additional allowances are limited to a total of 40,000. To the

extent these additional §405(i)(1) allowances exceed 40,000, they are reduced *pro rata* based on each B/G's share of these additional allowances. Allowances allocated under this subsection are based upon basic allowances only; bonus allowances are unaffected. The 40,000 allowances allocated under §405(i)(1) are basic allowances and are subject to the 8.9 million ton limitation of §403(a)(1):¹¹

$$\begin{array}{r}
 \text{B/G's Unadjusted} \\
 \text{Additional Basic} \\
 \text{\$405(i)(1)} \\
 \text{Allowances}
 \end{array}
 =
 \begin{array}{r}
 \text{B/G's Allowances} \\
 \text{Calculated Using} \\
 \text{Maximum Annual} \\
 \text{Average Fuel for Any} \\
 \text{3 Years, 1980-89}
 \end{array}
 -
 \begin{array}{r}
 \text{B/G's Allowances} \\
 \text{Calculated Using} \\
 \text{Regular Baseline}
 \end{array}$$

$$\begin{array}{r}
 \text{Total Additional} \\
 \text{\$405(i)(1)} \\
 \text{Allowances}
 \end{array}
 =
 \sum_{i=1}^{\text{Eligible B/Gs}}
 \left[
 \begin{array}{r}
 \text{B/G Level Unadjusted Additional} \\
 \text{Basic \$405(i)(1) Allowances}
 \end{array}
 \right]_i$$

$$\begin{array}{r}
 \text{B/G's Adjusted} \\
 \text{Additional Basic} \\
 \text{\$405(i)(1)} \\
 \text{Allowances}
 \end{array}
 =
 \begin{array}{r}
 \text{B/G's Unadjusted} \\
 \text{Additional Basic} \\
 \text{\$405(i)(1)} \\
 \text{Allowances}
 \end{array}
 \times
 \frac{40,000}{\text{Total Additional} \\ \text{\$405(i)(1)} \\ \text{Allowances}}$$

Section 405(i)(2) — Additional Basic Allowances for Certain Units with Reduced

¹¹ Note: To calculate allowances under this provision, the larger of either

- (1) the maximum average annual fuel consumption in any consecutive three year period during 1980-89 (NADB data field MXBS8089), or
- (2) Baseline fuel consumption

is substituted for baseline fuel in the allocation calculations for subsections (b)(1), (c)(1) (c)(2), (d)(1), (d)(2), (d)(4), (e), (f)(1), (g)(1), (g)(4), (h)(1), and (h)(3) of §405.

Actual or Allowable SO₂ Emissions

Eligibility:

B/Gs subject to §405(b)(1), also meeting the following conditions:

- the lesser of the B/G's 1980 SO₂ rate or SO₂ limit has fallen by 50 percent or more by enactment,
- will have an SO₂ rate less than 1.2 lbs/mmBtu in any year from 1996 through 1999,
- commenced commercial operation after January 1, 1970
- are owned by a utility whose combined commercial and industrial sales have increased by more than 20 percent between 1980 and enactment, and
- whose company-wide fossil fuel SO₂ emission rate has declined by 40 percent or more from 1980 to 1988.

B/Gs were determined to be eligible for this provision based on information in the Supplemental Data File and information submitted by the utility under 40 CFR §73.19.

Allocation Formula:

B/Gs eligible for this provision receive allowances equal to the difference between:

- allowances under §405(b)(1), calculated based on the B/G's average annual fuel consumption for any three consecutive calendar years from 1980 to 1989 inclusive, and
- allowances under §405(b)(1),

provided that such additional allowances are limited to a total of 5,000. To the extent that these additional allowances exceed 5,000, they are reduced *pro rata* based on each B/G's share of the additional allowances.

$$\begin{array}{l} \text{Adjusted Additional} \\ \text{Allowances} \\ \text{For §405(i)(2) B/G} \end{array} = \frac{\text{B/G's Unadjusted Additional} \\ \text{§405(i)(2) Allowances}}{\sum_{i=1}^{\text{Eligible B/Gs}} \left[\frac{\text{B/G's Unadjusted Additional} \\ \text{§405(i)(2) Allowances}}{5,000} \right]} \times \frac{5,000}{\sum_{i=1}^{\text{Eligible B/Gs}} \left[\frac{\text{B/G's Unadjusted Additional} \\ \text{§405(i)(2) Allowances}}{5,000} \right]}$$

As with §405(i)(1), these 5,000 allowances are basic allowances and are subject to the 8.9 million ton limitation of §403(a)(1). B/Gs will not be allocated the additional basic allowances until eligibility is continued. That is, the additional allowances will appear in the unit allowance subaccounts when the unit has demonstrated eligibility for the additional allowances.

Section 405(j) — Municipally Owned Oil/Gas Units

Introduction

Section 405(j) allocates additional basic allowances to affected municipally owned units serving generators with nameplate capacity less than or equal to 40 MW but greater than 25 MW.

Section 405(j) — Basic Allowance Allocations

Eligibility:

Existing municipally-owned oil and gas B/Gs serving generators smaller than or equal to 40 MW, the lesser of whose 1985 SO₂ rate or SO₂ limit is less than 1.2 lbs/mmBtu. These allowances are in addition to allowances allocated to these B/Gs pursuant to other parts of §405.

Allocation Formula:

B/Gs eligible for this provision receive additional basic allowances equal to the B/G's HT60SHR value, multiplied by the lesser of its 1985 SO₂ rate or SO₂ limit, divided by 2000:

$$\text{B/G's Additional Unadjusted Basic Allowances} = \text{HT60SHR} \times \left[\begin{array}{c} \text{1985 SO}_2 \text{ Rate} \\ \text{or} \\ \text{1985 SO}_2 \text{ Limit} \end{array} \right] \div 2,000$$

Section 406 — "Clean States" Bonus Allowance Provision

Introduction

Section 406 provides for bonus allowances for units in certain "clean" states with a 1985 statewide SO₂ emissions rate below 0.8 lbs/mmBtu, either upon the election of the Governor of the eligible state(s), or upon the calculation, by EPA, that the state would receive more allowances through such an election.

Section 406(a) — Additional Bonus Allowances

Eligibility:

All B/Gs which were in commercial operation in 1985, in states with a 1985 statewide SO₂ emissions rate of 0.8 lbs/mmBtu or less (averaged over all such B/Gs), and where either

- the Governor of such state elects to receive the additional bonus allowances, or
- B/Gs in the state obtain the most bonus allowances by receiving allowance allocations under this provision.

Allocation Formula:

B/Gs eligible for this provision receive bonus allowances up to a total of 125,000, multiplied by each eligible B/G's *pro rata* share of electricity generated in 1985 at all B/Gs in all §406-eligible states, for the calendar years 2000 through 2009:

$$\frac{B/G's \text{ Bonus Allowances}}{2000-2009} = 125,000 \times \frac{B/G's \text{ pro rata Share of Electricity Generated in 1985}}$$

where

$$\frac{B/G's \text{ pro rata Share of Electricity Generated in 1985}}{\text{Generated in 1985}} = \frac{\text{Electricity Generated by B/G in 1985}}{\text{Electricity Generated by All B/Gs in All Eligible States in 1985}}$$

These bonus allowances are available in lieu of any other bonus allowances for which B/Gs may be eligible.

Section 416 — Special Allowance Reserve

Introduction

Section 416 provides for a portion of basic allowance allocations to be set aside to create the "Special Allowance Reserve," which is used for the Agency's auction of allowances. The "Special Allowance Reserve" is to be created by withholding 250,000 basic Phase II allowances for each year beginning in 2000.

Section 416(b) — 250K Reserve

A "Special Allowance Reserve" of allowances is established by reserving 250,000 basic Phase II allowances per year, *pro rata*, from all Phase II affected B/Gs beginning in the year 2000.

Eligibility:

All B/Gs allocated basic allowances under §405.

Allocation Formula:

The deduction for the Special Allowance Reserve is calculated by reducing adjusted basic allowances according to the formula:

$$\text{B/G's Deduction for Auction and Sale Reserve} = \frac{\text{B/G's Adjusted Basic Allowances}}{8.9 \text{ million}} \times 250,000$$

Chapter 3 — Estimate of Effects of Repowering on Phase II Allowances

Introduction

Pursuant to Section 409(b)(1), and as implemented under 40 CFR §72.44 (published January 11, 1993 at 58 FR 3590), a unit satisfying the requirements of §409(a) to repower with a qualifying clean coal technology may be granted an extension for complying with Phase II SO₂ reduction requirements from January 1, 2000 through December 31, 2003. During the extension period, repowering units receive allowances in two parts: a basic allocation based on the unit's baseline times a 1.2 lb/mmBtu rate, and an incremental allocation based on the unit's baseline times the lesser of the unit's 1995 SO₂ limit or actual SO₂ rate, minus the basic allocation. The basic allowances allocated for repowered units are subject to the 8.9 million ton limitation of §405(a)(1). Therefore, the increase in allowances due to repowering is the amount by which these allowances exceed those that would be allocated if the unit did not repower. Note that, as mentioned in Chapter 1, these allowances are allocated based on 40 CFR §73.21. For the purpose of calculating the size of the repowering reserve and repowering deductions pursuant to §405(a)(2), the repowering allowances are calculated in this report. However, repowering allowance allocations are made pursuant to unit permit under §72.44 and are not included in Appendix A. The repowering reserve is calculated to reduce Phase II adjusted basic allowances by fewer than 3 thousand allowances annually during 2000 through 2009.

This chapter first briefly describes the CCT repowering allowances and offset requirements. The remainder of the chapter describes the calculation of Phase II CCT repowering allowances and the related allowance offsets.

CCT Repowering Allowances/Phase II Allowance Offsets

Pursuant to §405(a)(2), as discussed in Chapter 2, allowances due to repowering in 2000 would be offset by reducing basic Phase II allowances *pro rata*. The exact amount to be offset is defined as the difference between allowances allocated in 2000 and adjusted basic allowances, summed over all qualifying repowered B/Gs:

$$\text{Amount of Offset} = \sum_{i=1}^{\text{Qualifying CCT B/Gs}} \left[\frac{\text{Baseline} \times \left[\begin{array}{l} \text{The Lesser of the B/G's 1995 } \\ \text{SO}_2 \text{ Rate} \\ \text{or} \\ \text{SO}_2 \text{ Limit} \end{array} \right]}{2,000} \right] - \left[\text{B/G's Adjusted Basic Allowances} \right]_i$$

The increase would be offset equally over ten years, from 2000-2009. Note, however, that only the increase due to repowering in 2000 would be offset; the increase in the remaining years of the extension (i.e., 2001-2003) would simply be in addition to all other allowances. Thus, the annual set-aside would equal the total size of the offset, divided by 10:

$$\text{Annual Set-Aside} = \frac{\text{Amount of Offset}}{10}$$

Phase II repowering extensions are regulated as part of the Acid Rain permitting process. While many repowering plans were submitted to the Administrator, only two plans, affecting 11 units, were activated by the December 31, 1997 deadline. The repowering reserve is based on the repowering allowances calculated for these 11 units.

Table 3.1 - Repowering Plans Received

State	Plant	Existing Unit #	Generator	Nameplate Capacity [MW]
OH	R.E. Burger	1	1	62.50
		2	1	62.50
		3	2	62.50
		4	2	62.50
		5	3	100.00
		6	3	100.00
PA	New Castle	1	1	37.45
		1	2	40.24
		2	1	37.45
		2	2	40.24
		3	3	97.75
		4	4	113.64
		5	5	136.00

For calculating the units' repowering allowances, EPA used the baseline values from NADB, 1995 actual SO₂ emissions rates calculated from data reported using continuous emission monitors under Part 75, and 1995 State Implementation Plan (SIP) limits as reported by the utility. Because New Castle 1 and 2 were not in operation from 1994 through 1997, EPA used 1993 actual emissions rates as documented by the utility. The unit's adjusted basic allowances are those listed in Appendix A of this document. For New Castle 1 and 2, baseline values are summed across the generators for the boilers' total heat input. The data and calculated allowances are as follows:

Unit	Baseline	95 SIP Limit	95 Actual SO2 Rate	Adj. Basic Allowances	Repowering Allowances
RE Burger 1	1126895	9.02	4.5866	1273	1311
RE Burger 2	1102310	9.02	4.5863	1245	1283
RE Burger 3	1138731	9.02	4.5840	1286	1324
RE Burger 4	1165903	9.02	4.5926	1316	1361
RE Burger 5	2465197	9.02	4.5863	1336	4317
RE Burger 6	2457308	9.02	4.5931	1332	4299
New Castle 1	1181264	2.80	2.4089	1334	89
New Castle 2	1314372	2.80	2.4089	1485	98
New Castle 3	54113244	2.80	2.4247	2935	3628
New Castle 4	4954829	2.80	2.4708	2686	3435
New Castle 5	8598654	2.80	2.4749	4661	5979

